



NOTES

SEX CHROMOSOME DISORDERS

GENERALLY, WHAT ARE THEY?

PATHOLOGY & CAUSES

- Disorders caused by numeric abnormalities (addition/loss)/structural damage of one/both sex chromosomes (X, Y)
- Occur in approx. 1/448 live births
- Phenotypes less severe than autosomal defects due to X chromosome inactivation, low gene content of Y chromosome

SIGNS & SYMPTOMS

- Delay in puberty onset, absence of menstruation, ambiguous genitalia, infertility

DIAGNOSIS

LAB RESULTS

- Prenatal fetus chromosomal analysis
 - Amniocentesis, chorionic villi sampling of placenta

TREATMENT

MEDICATIONS

- Hormone replacement therapy

OTHER INTERVENTIONS

- No corrective treatment available

KLINEFELTER'S SYNDROME

osms.it/klinefelters-syndrome

PATHOLOGY & CAUSES

- Extra copy of X chromosome in individuals who are biologically male due to sex chromosome nondisjunction during maternal/paternal meiotic division
- Most common
 - 47, XXY karyotype
- Less common
 - Greater/lesser numbers of X chromosome 48, XXXY, 49, XXXXY, 46, XY/4, XXY mosaicism karyotypes
- Greater number X chromosomes → greater phenotypic abnormalities
- Most common sex chromosome abnormality; occurs in approx. 1/1000 live

births

- Leads to primary hypogonadism, impaired cognitive development

COMPLICATIONS

- Increased risk for psychiatric disorders, autism
- Problems with social interactions
- Delayed speech, language competence

Predisposition to diseases

- May result in death
- Pulmonary
 - Chronic bronchitis, emphysema
- Thromboembolic cancers
 - Germ cell tumors, breast cancer

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(morbidity much higher in individuals with Klinefelter), non-Hodgkin lymphoma

- Leg ulcers
- Diabetes mellitus

SIGNS & SYMPTOMS

- Newborns who are biologically male, phenotypically normal (e.g. with male external genitalia)
- **Tall stature** with decreased upper to lower **extremity ratio** due to decreased levels of testosterone, unsuppressed follicle-stimulating hormone (FSH), luteinizing hormone (LH)
- **Decreased testes size**
- Increased levels of serum **FSH, LH**
- Variably **decreased** levels of serum **testosterone** → breast enlargement (increased risk of breast cancer); reduced facial, body hair; infertility



Figure 27.1 The body habitus of an individual with Klinefelter's syndrome. The body type is rounded with prominent gynecomastia.

DIAGNOSIS

LAB RESULTS

- Blood/urine test
 - Abnormal hormone levels
- Karyotype analysis

OTHER DIAGNOSTICS

- Postnatally, observe signs of physical clinical manifestations
 - Evaluation for infertility, enlarged breast tissue
 - May present with cryptorchidism (undescended testes)

TREATMENT

MEDICATIONS

- Testosterone replacement therapy; stimulate changes that typically occur during puberty (e.g. facial, body hair growth; increased muscle mass, penis size; improved bone density)

SURGERY

- Breast tissue removal

PSYCHOTHERAPY

- Psychological counseling

OTHER INTERVENTIONS

- Sex chromosome changes can't be corrected
- Supportive therapy minimizes adverse effects, improves quality of life
 - Speech therapy
 - Fertility treatment

TURNER SYNDROME

osms.it/turner-syndrome

PATHOLOGY & CAUSES

- Completely/partially missing X chromosome in individuals who are biologically female
 - **Monosomy 45,X** karyotype (most common)
 - Mosaic X chromosome monosomy: 45,X/46,XX, 45,X/46,XY
 - X chromosome abnormalities

COMPLICATIONS

- Primary hypogonadism
- Predisposition to several diseases, may result in death
 - **Cardiovascular**: typically involves left outflow, **coarctation** of aorta (e.g. aortic valve abnormalities, elongated transverse aortic)
 - **Congenital renal anomalies**: system, positional malformations
- Hearing loss, hypothyroidism, liver function abnormality incidences increase with age
- Low bone mineral density (BMD)
 - Prone to fractures
- **Ovarian insufficiency**, infertility: premature oocyte death, degeneration of ovarian tissue
- Increased risk for learning disabilities, attention-deficit/hyperactivity disorder (ADHD)

SIGNS & SYMPTOMS

- Newborns
 - Congenital **lymphedema** (hands, feet), **webbed neck**, short fourth metacarpal
- **Short stature**, **broad chest** with widely spaced nipples, low hairline

DIAGNOSIS

DIAGNOSTIC IMAGING

Fetal ultrasound

- Cardiac/renal abnormalities, short femur

LAB RESULTS

- Karyotype analysis

TREATMENT

MEDICATIONS

- Growth hormone therapy
 - Promote height and bone growth
- Estrogen therapy
 - Promote breast, uterine development